



Phosphorus removal from eutrophic waters with a polymer nanocomposite containing aluminium

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Intensive agriculture production and industrial expansion are causing an increase on nutrient release (phosphorus and nitrogen), resulting in over-enrichment of soils and aquatic bodies. The nutrient over-enrichment of aquatic ecosystems leads to an excessive biomass growth. Eutrophication processes have negative effects on biology, chemistry and human use of lakes and rivers, namely by cyanobacteria toxins release. The Water Framework Directive set a tight schedule for water quality recovery and in order to implement a scientific based policy for eutrophication remediation and to attain a good water status, prospective scenarios are being considered in decision making processes [1]. Based on biogeochemical models, the need to lower phosphorus concentration on surface waters and to avoid phosphorus impact from resolubilisation processes are seen as mandatory [2]. One of most common water quality treatment strategies is based on chemicals addition to promote phosphorus precipitation [3]. However, these methods may be a source of ecological contamination with sludge production problems. Moreover, being phosphates a non-renewable source, the recovery and recycling of phosphorus is essential.

Therefore, the present work concerned the removal and recovery of phosphorus from water using a new developed polymer nanocomposite containing aluminium nanoparticles (HPN). The results point that this new material removes 0.80 ± 0.01 mgP/g in a pH interval between 2.0 and 6.5. Moreover, it could be regenerated using an HCl dilute solution. The issues that contribute mostly to the attractiveness of HPN-Pr as phosphorus sorbent are its moderate removal capacity, production process feasible at industrial scale, reuse after regeneration and recovery of phosphorus. The results obtained indicate that this material is a efficient alternative to solve the eutrophic problem.

References:

- [1]Ribeiro D., Martins G., Nogueira R., Cruz J. V., Brito A.G. (2008). Phosphorus fractionation in lake volcanic sediments (Azores – Portugal). *Chemosphere* 70 (7).
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